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Deutsches Zentrum für Luft- und Raumfahrt (DLR), Institut für Physik der Atmosphäre, Oberpfaffenhofen, Germany

The International Conferences on Alpine Meteorology: Characteristics and trends from a 57-year-series of scientific communication

H. Volkert

With 2 Figures

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Summary

General information is assembled about origin, conduct and written documentation concerning the full series of 29 biennial International Conferences on Alpine Meteorology (ICAM) between 1950 and 2007. The slowly evolving format of interactive scientific communication is apparent since the series was started by Mario Bossolasco, a visionary geophysical scientist. A comparison with the related mountain meteorology conference series organized by the American Meteorological Society helps to put the European achievement in perspective. Such a compact bookkeeping activity is considered essential for valuing properly the considerable impact of a regular, focussed, single-session conference series like ICAM for issues like international cooperation, practical education of students, and scientific advancement in general.

1. Introduction

Science deals with a ''system of knowledge concerned with the physical world and its phenomena'' (www.britannica.com/dictionary; Entry: science). Debates about the acquisition of such knowledge by individuals and its dissemination to colleagues have a history spanning at least two millenia (cf. Zeki 2000). *Conferences* are ''meetings of persons for discussing matters of common concern'' (ditto; Entry: conference). Conferences dealing with science and with physics in particular are prominently discussed with regard to sociologic issues such as personal fairness, intercultural rules, and gender stereo-typing (cf. Langedijk 2005). Therefore it appears both useful and timely to consider the knowledge disseminating mechanisms of the multi-decadal and regular series of International Conferences on Alpine Meteorology (ICAM), which started in 1950 and recently had its 29th meeting in Chambéry, France.

Bifurcation points of scientific thought can only rarely be linked to discussions at a conference. For meteorology the double gathering in Bergen (Norway), organized by Vilhelm Bjerknes separately for all non-Germanic speakers and the remainder in the summer of 1920 right after the end of World War I, was identified as a turning point for the prevailing mainstream theories for cyclogenesis (Davies 1997). In general, scientific conferences are one of the methods for consolidating research results parallel to or before a formal publication in peer-reviewed journals.

Correspondence: Hans Volkert, Deutsches Zentrum für Luft- und Raumfahrt (DLR), Institut für Physik der Atmosphäre (IPA), Oberpfaffenhofen, 82234 Wessling, Germany (E-mail: hans.volkert@dlr.de)

The unbroken series of ICAM spanning more than five decades offers the possibility of inspecting the gradual changes in conference size and format with time and attempting to generalize conclusions about the function of such medium size events for progress in atmospheric science.

This short survey has several aims. First, it sets out to recall the beginning of the ICAM series in 1950. Second, the conduct and gradually changing scope of the conferences are briefly chronicled together with a documentation of the available published material. Next, a comparison with a similar undertaking in North America makes clear what has been achieved in Europe and how an intensified cooperation across the Atlantic can provide real synergies. Then, a look to the future is attempted that takes into account the growing interest in weather and climate research in the vicinity of mountain ranges, and finally a few general conclusion are made. These points are dealt with sequentially in the following sections.

Table 1. Time series of ICAMs circling five times through half a dozen of Alpine countries with year and number, country code (cc), location and source of proceedings or volumes of extended abstracts. Sources for entries in the last column: Annalen der Meteorologie Nr. 30, pp. 369–70 (up to 1994); from internet searches for later years

Year	cc	Location	Proceedings	Year	cc	Location	Proceedings
1950 1st	I	Milano and Torino	Geof. pura e appl. **17**, 1950, 81–245	1980 16th	F	Aix-les-Bains	Soc. Météorol. de France, Boulogne-Billancourt, 1980, 462 pp
1952 2nd	A	Obergurgl	Wetter und Leben, **5**, 1953, 1–54	1982 17th	D	Berchtesgaden	Ann. d. Meteorologie Nr. 19, 1982, 293 pp
1954 3rd	CH	Davos	Wetter und Leben, **6**, 1954, 187–211	1984 18th	Y (Cro)	Opatija	Zbornik met. hidrolog. radova **10**, 1984, 345 pp
1956 4th	F	Chamonix	La Météorologie **IV**, 1957, 111–377	1986 19th	A	Rauris	Österr. Ges. f. Meteorol., Vienna, 1987, 457 pp
1958 5th	D	Garmisch	Bericht Dt. Wetterdienst Nr. 54, 1959, 302 pp	1988 20th	I	Sestola	Servizio Meteorol. Ital., Roma 1988
1960 6th	Y (Slo)	Bled	Hydromet. Inst. Report, Beograd, 1962, 514 pp	1990 21th	CH	Engelberg	Reports MeteoSwiss Nr. 48, 1990, 437 pp and Nr. 49, 1991, 135 pp
1962 7th	I	Sestrière	Geofisica e Meteorologia **II**, 1963, 303 pp	1992 22nd	F	Toulouse	Soc. Météorol. de France, 1992, 452 pp and La Météorologie **VII**, **45**, 1992, 1–64
1964 8th	A	Villach	Carinthia **II**, special issue no. 24, Vienna, 314 pp	1994 23rd	D	Lindau	Ann. d. Meteorologie Nr. 30, 1994, 370 pp
1966 9th	CH	Brig and Zermatt	Reports MeteoSwiss Nr. 4, 1967, 366 pp	1996 24th	Slo	Bled	Hydrometeo. Inst. of Slovenia, Ljubljana, 1996, >303 pp
1968 10th	F	Grenoble	La Météorologie, special issue, 1969, 464 pp	1998 25th	I	Torino	CIMA proceedings, Torino, 1998, >272 pp
1970 11th	D	Oberstdorf	Ann. d. Meteorologie Nr. 5, 1971, 300 pp	2000 26th	A	Innsbruck	Österr. Beitr. Meteorol. Geophys., issue 23, 2000, on CD
1972 12th	Y (BH)	Sarajevo	Zbornik met. hidrolog. radova **5**, Beograd, 1973, 375 pp	2003 27th	CH	Brig	Online: http://www.map.meteoswiss.ch/map-doc/icam2003/0th.index.htm
1974 13th	I	St. Vincent (Valle d'Aosta)	Riv. di Geofisica, special edition, 1975, 201 pp	2005 28th	Cro	Zadar	Online: http://www.map.meteoswiss.ch/map-doc/icam2005/
1976 14th	A	Rauris	Arb. ZAMG Nr. 32 and 33, Vienna, 1978	2007 29th	F	Chambéry	Online: http://www.cnrm.meteo.fr/icam2007/
1978 15th	CH	Grindelwald	Reports MeteoSwiss Nr. 40, 1978, 332 pp; Nr. 41, 1979, 63 pp	2009 30th	D	Rastatt (planned)	Yet to be determined

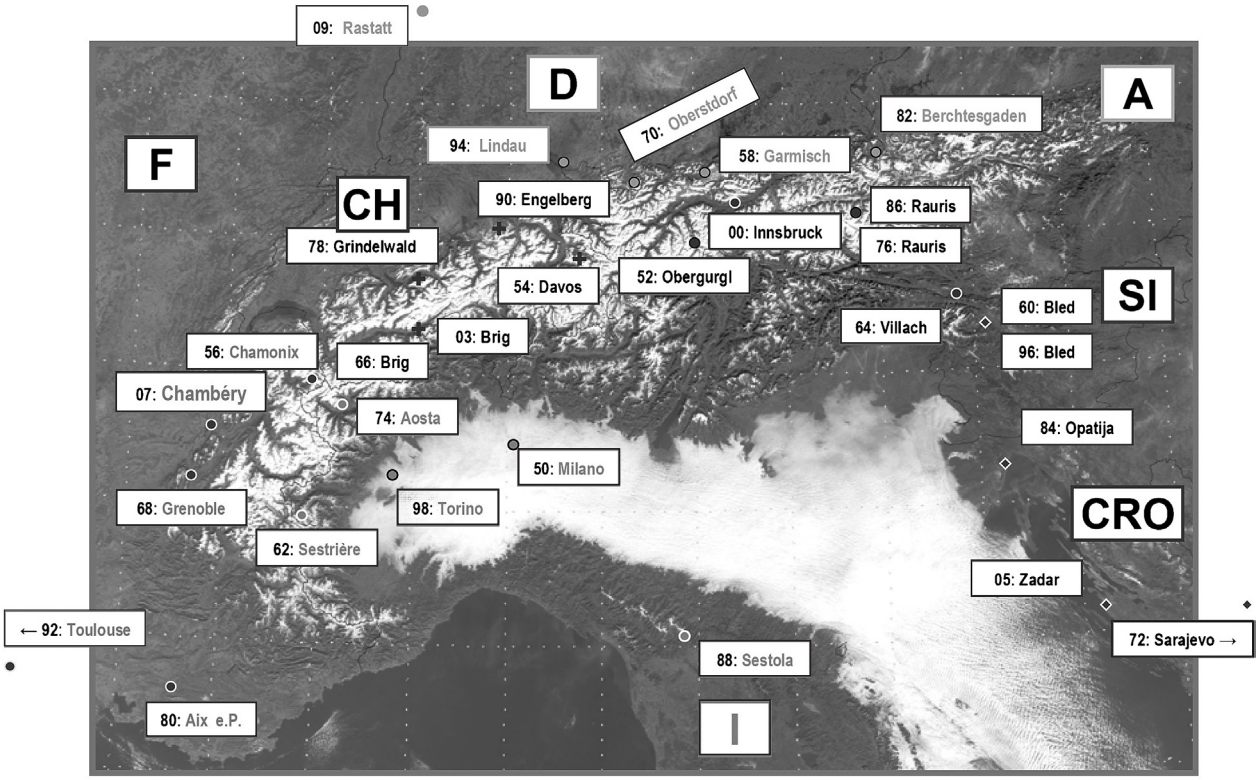

Fig. 1. Spatial distribution of the ICAM locations within the wider Alpine area shared by (now) seven Alpine countries (A, CH, CRO, D, F, I and SI) from Milano (1950) to Chambéry (2007) and Rastatt (planned for 2009; cf. Table 1). The Alpine topography of irregular snow-covered massifs separated by long, deep and snow-free valleys is visualized by a cloud-free satellite scene (except low stratus over the Po valley and the Adriatic Sea; 2 February 2002; MODIS instrument; on a stereographic projection with a $1^\circ \times 1^\circ$-dotted grid)

2. The origin of ICAM

The first ICAM took place in 1950 in Italy due to the personal initiative of Mario Bossolasco, who, since 1946, was a university professor and director of the Geophysical and Geodetic Institute in Genoa. Bossolasco was born on 30 June 1903 in Torino and died on 7 April 1985 in the same city (Eva 1988). After graduating in mathematics he specialized in geophysics, including seismology and meteorology. Under his initiative the research journal *Geophysica Pura ed Applicata* was started in 1939. This journal was renamed *Pure and Applied Geophysics* in 1973, after he transferred it to the Swiss publisher Birkhäuser and quit his work as editor after 34 years. Bossolasco had studied and worked abroad before World War II and was well connected in the Italian and international research communities through personal collaborations and through his work with international institutions such as WMO and IUGG.

Just five years after the end of the World War II, Bossolasco persuaded the national *Istituto Geofisico Italiano* to convene the *Primo Convegno Internazionale di Meteorologia Alpina* – the First International Conference on Alpine Meteorology (cf. Table 1 and reference therein). The conference papers were published only three months after the conference in the very journal that Bossolasco had edited since a full decade, in either Italian, English, French or German. The initiative was apparently inspired by pan-European hopes prevailing during the post-war period. Bossolasco's opening speech expressed a clear vision in which Alpine meteorology, an interdisciplinary topic at the heart of geophysics, was expected to be a prototype for post-war international cooperation. Explicit mention was made of the considerable impact of the Alps on large scale flows – like secondary cyclogenesis in the Gulf of Genoa as a result of splitting of larger cyclones coming from the Atlantic –, of the spawning of severe weather in the wake of the

Alps, and of the Alps constituting a very special natural laboratory for a number of meteorological fields. He concluded not without pathos: ''As shown by our science and its numerous applications, the Alps can help to unite the nations rather than dividing them''. The topics presented at the conference included rotating tank experiments with obstacles (Fultz, USA), Föhn studies in Italy (Bossolasco, Italy), a synoptic investigation of Alpine precipitation (Striffling, France), and stratospheric flows above Europe (Hovmöller, Sweden).

The first ICAM produced sufficient momentum so that the second and third conferences were organized in Austria (1952; 128 participants) and Switzerland (1954; 129 participants). Of key importance was the active involvement of the national meteorological services and the recently founded *World Meteorological Organization* (WMO) as their common international body under the auspices of the newly formed *United Nations*. General reports and shorter abstracts of the oral presentations were published in the journal *Wetter und Leben* about six months after the conference (cf. Table 1). The spirit of friendship among colleagues and the very limited resources available during the first post-war decade shine through these reports.

3. The conduct of ICAM through five Alpine cycles

As outlined in Table 1, the other three Alpine countries France, Germany, and (former) Yugoslavia followed the founding trio, before the second cycle started in 1962, again in Italy. Like clockwork the third cycle began in 1974, the fourth in 1986, while the fifth will be completed with the 30th ICAM to take place in Germany in 2009. A nine-month-shift from September of even years to late spring of odd years took place in 2003 to establish an alternating sequence with the Mountain Meteorology Conference (MMC) series of the American Meteorological Society (AMS) and to maintain the trans-Atlantic cooperation which had developed during the conduct of the Mesoscale Alpine Programme (1995–2005; cf. Volkert and Gutermann 2007). Geographically, the Alps themselves constituted the focal area of the 27 different venues up to 2007 (Fig. 1), while neighbouring ranges were occasionally touched as well, including the Pyrenées (Toulouse 1992), the Appenines (Sestola 1988), and the Dinaric Alps (Sarajevo 1972; Opatija 1984; Zadar 2005).

An inspection of the proceedings volumes reveals a number of general points: (i) until 1976 proceedings were published well after the conference, often in quite elaborate edited layouts, (ii) from 1978 onward volumes of extended abstracts were distributed at the conference to assist all participants in selecting presentations of highest personal interest, (iii) in 1978 and 1990 Switzerland produced both on-site and resumé versions, (iv) until the 1970s all presentations were oral, leading to an increasing number of rejections (cf. Introduction to Ann. Meteorol. 5, 1970), (v) a growing number of poster presentations and the exclusive use of English became regular practise only during the late 1980s, (vi) the large mountain meteorology field campaigns ALPEX (1982), PYREX (1990), and MAP-SOP (1999) are well reflected in contributions to the following ICAMs, (vii) from 2003 onwards submission of extended abstracts via the internet greatly eased their collection, but a printed volume proved to be of unmatched value to the participants during the event, especially in comparison with the publication on a compact disc (CD).

Here it is not possible to present a thorough review of key scientific contributions in the ICAM series that eventually led to the advancement of mountain meteorology. Nevertheless a subjective selection of important explorative studies is given here (in the following the superscript[T1] refers to the appropriate volume listed in Table 1), mostly concerning topics which are still of high interest today: (i) airborne observations of mountain gravity waves (Berenger and Gerbier 1957[T1]), (ii) a study of the vertical distribution of semi-perma-frost soils within the Alps (Hastenrath 1959[T1]), (iii) high-elevation systematic measurements of direct solar radiation (Bossolasco et al. 1963[T1]), (iv) special ground based observations in support of features detected from the new polar orbiting meteorological satellites (Kletter 1963[T1]; Berenger 1969[T1]), (v) airborne measurements of the diurnal variation of heating profiles in Alpine valleys (Reinhardt 1971[T1]), (vi) trials to quantify precipitation amounts in mountainous terrain by radar observations (Attmannspacher and Aniol 1971[T1]),

(vii) mesoscale analyses using a specialized Alpine weather chart format (Steinacker 1978[T1]), (viii) non-hydrostatic simulation of valley flows (Groß, 1982[T1]), (ix) the dynamical impact of the Alps on the upstream flow from theoretical and observational findings (Davies, Binder and Furger 1984[T1]), (x) simulation of orographic precipitation by operational numerical weather prediction models (Binder and Wacker 1990[T1]), and (xi) a first collection of the PYREX field campaign results (Bougeault 1992[T1]) as well as challenges and prospects for an envisaged Mesoscale Alpine Programme (Volkert 1994[T1]). The full extended abstracts of the last three ICAM meetings can be viewed online (links are given in Table 1). A detailed statistical overview regarding the scientific presentations during the first six ICAMs was compiled by Lauscher (1963[T1]; in German).

4. Comparison with AMS mountain meteorology conferences

The phasing-in of ICAM with the closely related American Meteorological Society's MMCs in 2002 was mentioned above. Interestingly, this series started in 1978 with the Conference on Sierra Nevada Meteorology at Lake Tahoe, California, sponsored by the AMS and the US Forest Service. Earlier conferences related to mountain meteorology included the one-day Symposium on Mountain Meteorology in Fort

Table 2. Time series of AMS Mountain Meteorology Conferences, held mainly in the USA, with year and number, country code (cc) and state code (sc), and comments (on the preprint volumes and online access to conference programmes and extended abstracts)

Year	cc, sc	Location	Comments	Year	cc, sc	Location	Comments
1978 1st	USA, CA	Lake Tahoe	Conference on Sierra Nevada Meteorology, AMS and USDA Forest Service	1998 8th	USA, AZ	Flagstaff	Preprints, 8th Conf. on Mountain Meteorology, AMS, 475 pp
1981 2nd	USA, CO	Steamboat Springs	Preprints, 2nd Conf. on Mountain Meteorology, AMS, 408 pp	2000 9th	USA, CO	Aspen	9th Conf. on Mountain Meteorology, AMS, 427 pp; online at: http://ams.confex.com/ams/AugAspen/techprogram/programexpanded_28.htm
1984 3rd	USA, OR	Portland	Preprints, 3rd Conf. on Mountain Meteorology, AMS, 233 pp	2002 10th	USA, UT	Park City	10th Conf. on Mountain Meteorology, AMS, 440 pp. Joint with MAP meeting; online at: http://ams.confex.com/ams/10Mountain/techprogram/programexpanded_111.htm
1987 4th	USA, WA	Seattle	Preprints, 4th Conf. on Mountain Meteorology, AMS, 278 pp	2004 11th	USA, NH	Barlett	Joint with MAP meeting; no published Conf. volume.; online at: http://ams.confex.com/ams/11Mountain/techprogram/programexpanded_237.htm
1990 5th	USA, CO	Boulder	Preprints, 5th Conf. on Mountain Meteorology, AMS, 337 pp	2006 12th	USA, NM	Santa Fe	No published Conf. volume; online at: http://ams.confex.com/ams/SantaFe2006/techprogram/programexpanded_350.htm
1992 6th	USA, OR	Portland	Preprints, 6th Conf. on Mountain Meteorology, AMS, 457 pp	2008 13th	CAN, British Columbia	Whistler (planned)	
1995 7th	USA, CO	Breckenridge	Preprints, 7th Conf. on Mountain Meteorology, AMS, 390 pp				

Collins, Colorado, in 1967 (Reiter and Rasmussen 1967) and the 1976 Joint Scientific Meeting on Mountain Meteorology and Biometeorology in Interlaken, Switzerland, which was partially supported by the AMS. Up to now, there have been 12 conferences in the MMC series (Table 2). Overseen by the Mountain Meteorology committee of AMS, the earlier MMCs took place every 2 or 3 years. The alternate year phasing of this conference series with the biennial ICAM conferences has resulted in opportunities for mountain meteorologists to meet on a yearly basis on either side of the Atlantic ocean.

Since 1998 the cooperation across the Atlantic for the planning and conduct of MAP and its observing period in 1999 led to increasing participation in ICAM meetings by North American meteorologists and in MMC gatherings by European meteorologists. The enhanced level of international exchange has invigorated both conference series and has even led to some fresh ideas that are being considered for improving other AMS technical conferences (cf. also Schultz et al. 2007).

5. The Future of ICAM

The steady increase of submitted papers and of participants over the past four years (now regularly exceeding 200) indicates that ICAM remains firmly established as the European counterpart to the shorter series of the AMS Mountain Meteorology conferences. The sustained interest in mountain meteorology topics has led to a proposal that additional host countries be added after 2009. In June 2007, the ICAM steering committee adapted its terms of reference to invite offers from countries such as the UK and Norway. Such a widening of the perspective may broaden the focus of ICAM to include additional mountain areas and mountain research topics. This is fully in line with the Bossolasco's vision at the start of ICAM in 1950.

Planning for the 30th ICAM has already started. The provincial German town of Rastatt, situated at the river Murg in the wide Rhine valley and close to the slopes of the northern Black Forest, should offer an ideal venue within the inner observation region of the summer 2007 COPS (Convective and Orographically-induced Precipitation Study) field campaign. COPS is listed as a research and development project of the World Weather Research Programme of WMO. Partly a heritage from MAP, COPS again drew together a large number of scientists from the USA and many European countries. ICAM is expected to maintain its presently high momentum for some years to come, as the institutional backing from the national meteorological services continues to lead to personal engagement by and scientific exchange among teams working in university institutes and in public laboratories.

6. Conclusions

What general conclusions can be made after a brief inspection of the complete time series spanned by 29 ICAM meetings so far? The author's personal recollection from his participation in the events 1982, 1994 and from 2000 onwards is that all ICAMs have a flavour of scientific family meetings, with modesty in presentation and in the claims of the presented results, in truly multi-lingual and multi-cultural settings. It was surprising to detect these roots extending right back to the start in 1950.

The regularity of the unbroken biennial sequence appears remarkable, along with the full record of published conference proceedings, nearly all of them in print. It would certainly be useful to organize a full collection of the distributed conference proceedings at some institutions to ease a more systematic survey of problems, techniques, and solutions as they were documented in a preliminary fashion prior to the frequently occurring formal publication in peer-reviewed journals.

On the other hand slow changes in the conference format have become evident. Within the first two decades the ICAMs also served as continuing education courses as they frequently featured lecture type presentations. During the 1970s and 1980s, participation began to necessitate a personal contribution; so the format of poster presentations was adopted along with the sole use of English for all spoken and written communications. The positive unifying and strengthening effect of large-scale cooperative field campaigns became clear together with true trans-Atlantic synergies by the official and alternating link with MMCs of AMS (cf. also Volkert

Fig. 2. Two snapshot samples displaying the majority of ICAM participants in 2003 and 2007: above – 21 May 2003 in the high Alpine setting of Kühboden/Fiescheralp above Brig (CH; photos: Brigitta Klingler); below – 6 June 2007 in an Alpine valley in front of the Chambéry conference centre (F; photo: Daniel Goetz). The considerable number of persons present at both occasions demonstrates continuity, while the variety of age groups also reflects a healthy mix of experiences from meteorological services, research laboratories and university institutes

and Gutermann 2007). As the participation from Asia and even southern hemisphere countries increases further during the coming years, the intertwined events of ICAM and MMC have the potential to develop into a global forum for mountain meteorology.

Arguably, conferences are a hidden part of the universal *infrastructure* in meteorology; long time series, as for ICAM, tell a historical *narrative* of their own; and the topics dealt with at the ICAMs touch *ontologies* as the various scales and techniques applied. So the pieces of atmospheric science brought together at ICAMs over more than half a century constitute a special theme in the history of weather and climate, following the recent structuring of Fleming (2006). In the end, we want to underscore that a conference is made by people for people. A glance at the participants from the gatherings in 2003 and 2007 (Fig. 2) reveals a sound mixture of younger and older scientists, of women and men as well as good continuity over time. The scientific articles within this special issue demonstrate breadth and depth of the contributions to the 29th ICAM in Chambéry and we are confident of obtaining a sustained combination of quantity with quality at the 30th ICAM in 2009.

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